Vol. XXIII. Part IV. DECEMBER, 1952.

THE

TEA QUARTERLY

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THE JOURNAL

OF THE

TEA RESEARCH INSTITUTE

OF CEYLON

Edited by

J. LAMB, M.Sc., F.R.I.C., A.I.C.T.A.

Director, Tea Research Institute

THE TEA RESEARCH INSTITUTE,

St. Coombs, Talawakelle,

Ceylon.

I have borrowed largely from Bulletins of Statistics published by the International Tea Committee. A visit to East Africa in the early part of the year, following a visit to North India three years ago, has impressed me with the necessity for understanding our strength and our weakness in Ceylon.

Firstly, as the figures in Table II shew, the world's tea industry is expanding.

TABLE II

Planted acreages in thousands of acres

	1939	1950
North India ..	677	612
Pakistan ..		77
South India ..	163	169
Ceylon : Estates ..	492	496
Small Holdings ..	61	65
Indonesia : Estates ..	346	191
Small Holdings ..	184	?
East Africa ..	41	58
Japan ..	98	68
Malaya ..	7	8
Mozambique ..	6	24
U.S.S.R. ..	120	?
Brazil ..	—	4

India and Ceylon have more than maintained their planted acreages since 1939. In East Africa, both British and Portuguese, there is steady expansion. It will be noted that Mozambique has increased its acreage from 6,000 to 24,000 since 1939. Brazil has planted 4,000 acres and there are current reports of plans to plant tea in South America, West Africa and New Guinea. However, since it appears fairly certain that 25% of the Indonesian acreage has actually been destroyed, there is no cause for immediate alarm.

(*Note by Editor* — During a recent visit to the Tea Research Institute, Sir Percival Griffiths, Adviser to the Indian Tea Association, expressed the opinion that this figure was a gross exaggeration).

When Indonesia was over-run by the Japanese, a gap of 180,000,000 pounds was left in our accessible tea markets. Since 1939 there has been a remarkable increase in production in India and Ceylon which amounts to some 200 million pounds. As Indonesian production is restored (and last year it reached 100 million) over-production is inevitable. The relevant figures are given in Table III.

TABLE III

Production (in thousands of pounds)

	1939	1951
North India ..	390,000 }	506,000
Pakistan ..	}	53,000
South India ..	77,000	115,000
Ceylon ..	237,000	326,000
Indonesia : Estates ..	155,000	74,000
Small Holdings ..	28,000	27,000
East Africa ..	23,000	36,000
Japan ..	127,000	92,000
Malaya ..	1,000	4,000
Mozambique ..	1,000	7,000
U.S.S.R. ..	25,000	?
Brazil ..	——	(2,000 in 1949)

Fortunately, the demand for tea is still very strong. There are so many complications in gathering statistics that it is difficult to say with any assurance that it has increased. The production and consumption in countries such as China and the U.S.S.R. is unknown, but it is estimated that China and Formosa exported 40 million in 1950. On the basis of available figures the world's tea market may be analysed as shewn in Table IV.

TABLE IV

Production and export of tea

In million of pounds (Year 1950)

	Production	Export
India	610	393
Pakistan	52	16
Ceylon	316	298
British East Africa & Nyasaland	36	29
Indonesia	78	62
China	? }	40
Formosa	17 }	(Estd.)
Japan	92	16
U.S.S.R.	?	—
Other Countries.. ..	?	11
World Total ..		865
Black Tea	?	829
Green Tea and other kinds..	?	36

India and Pakistan consume a considerable proportion of their production whereas from Ceylon we export the greater part of our crop. Japan also consumes the greater part of her own tea.

The most important markers are, however, outside the tea producing areas and of these, the Commonwealth countries are by far the most important as the summary given in Table V shows :—

TABLE V

Approximate consumption – 1948–50

(In millions of pounds)

Importing Countries		*Exporting Countries*	
United Kingdom	409	India	150
Australia	52	Pakistan	30
Canada	45	Ceylon	15
South Africa	19	Japan	61
New Zealand	14	Indonesia	?
U.S.A.	98		(in 1939–29)
Egypt	34		
Iran	30		
Ireland	23		
Morocco	20		
Netherlands	16		
Germany	3		

India is next to the United Kingdom in the total amount of tea consumed. The U.S.A. is also an obviously important market and the potentialities there may be illustrated by the per capita figures displayed in Table VI.

TABLE VI

Average consumption of tea per head

(In pounds per head) (Average 1948–50)

(Figures to the nearest quarter of a pound)

United Kingdom	8¼	Iran (Persia)	1¾
Ireland (Republic)	7¾	U.S.A.	¾
Australia	6½	U.S.S.R.	?
New Zealand	7¼	India	½
Canada	3¼	Pakistan	½
Netherlands	1¾	Ceylon	2
Iraq	3	China	?
Morocco (French)	2¼	Indonesia	?
Union of S. Africa	1½	Japan	¾
Tunisia	1½		

All figures comprise both imported tea and (where applicable) locally-produced tea.

Although America consumes 98 million pounds the per capita consumption is only 3/4 pound per head. The consumption in Canada is also low by comparison with the United Kingdom, Australia and New Zealand, and there is an obvious need for sales promotion campaigns in these countries. I believe that good quality pungent, attractive liquouring Ceylon high grown teas are more likely to be able to compete with coffee and aerated drinks based on caffeine than the soft, full teas which constitute the bulk of the world's supplies. It is interesting to note that in spite of the 150 million pounds consumed in India it amounts to only ½ pound per head.

The exports from Ceylon, as shown in Table VII, follow the general pattern and the Commonwealth countries buy 2/3rd of our crop.

TABLE VII

Principal Ceylon Exports. 1951

(In millions of pounds)

United Kingdom	111	U.S.A.	28
Australia	43	Egypt	24
Canada	15	Iraq	13
South Africa	18	Iran	3
New Zealand	13	Netherlands	4
Malaya	2	Ireland	2
Sudan	½	Arabia	3
		Palestine	1
	202½	Turkey	1
		Libya	3
		Tunisia	4

Egypt, Iraq, and in more prosperous times Iran, are noteworthy countries who tend to favour coloury teas of the fine appearance rather than quality, and are, therefore, complementary to the United Kingdom blenders who are more interested in liquoring quality and are less concerned about appearance. The sale of our low-country teas tends to depend on prosperity in the middle east.

I think I have given enough statistics to indicate that we have to face severe competition in the future. Eliminating the consideration of artificial trade barriers which are purely political problems and, therefore, outside my province, success in competition must depend on :—

(*a*) Producing teas which are of better quality than those of our competitors.

(*b*) Producing at an equal or lower cost than our competitors.

Although I am convinced that our future in Ceylon lies in the production of quality teas, we must produce those quality teas at a reasonable price. The factors influencing cost of production are, therefore, of the greatest importance.

They are basically from the purely agricultural point of view :—

(1) Yield per acre.
(2) Crop distribution.
(3) Technique for maintaining yield.

You will doubtlessly appreciate the importance of labour and material costs. The largest single item in the actual cost of production is labour. Variations in labour costs and the cost of materials between the various tea producing countries are almost entirely due to political factors which, I repeat, are outside my province. I will, therefore, confine my analysis to agricultural factors and proceed with the consideration of quality and absolute cost.

Quality depends on :—

(*a*) Climate, largely influenced by latitude and elevation above sea level
(*b*) The standard of plucking.
(*c*) The type of bush. China and China hybrid types tend to give better quality than the pure Assam types.

Absolute Cost

1. Yield per acre

The actual cost of producing high yielding tea is obviously lower than the actual cost of production from poor areas :—

Yield depends on :—

(*a*) Climate } Rainfall, Temperature
(*b*) Soil.
(*c*) Type of bush. Assam types tend to yield more than China types. Individual China hybrids are capable of quite high yields.

2. Crop distribution

A steady yield throughout the year is obviously more economical to harvest and manufacture than heavy flushes for short seasons. The North Indian crop is entirely seasonal, and in Ceylon the crop distribution in Uva is much more uneven than the crop distribution in the south west monsoon zone.

3. Technique for maintaining yields

Where the soil is rich, nutrients may be literally mined from it by taking heavy yields of plant material at comparatively low cost. On poorer soils, the maintenance of yield depends on heavy applications of fertilisers and the most careful management.

In Assam, East Africa and Indonesia, rich soil has simplified their production problems, but in Ceylon we have been forced to use large quantities of fertilisers and to meet high costs for growing green manures.

There are fields of tea in Ceylon which are 100 years old and the greater part of the tea areas have been continuously cropped for well over half a century. The maintenance and actual *increase* in yield is no mean achievement under tropical conditions where high soil temperatures, and high rainfall, cause rapid loss of nutrients unless the most careful management is practiced. The indigenous methods tend to tap the small capital of fertility in the soil and then to move on, allowing natural regeneration processes via the grasses to restore fertility. Small holders have not yet realised the actual necessity for conservation agriculture. Whatever the merits and demerits of capitalism and company or plantation agriculture, it is essential to realise that the preservation of fertility or absolute capital is their primary object, at least in Ceylon tea, otherwise capital assets decline and dividends fall.

The Ceylon Tea Industry uses very remarkable amounts of fertilisers, comparable in amount to the total consumption in many other highly advanced agricultural countries. The figures reproduced in Table VIII are abstracted from the Commonwealth Economic Committee's 34th Report on the trade in fertilisers. I assume that the tea industry consumes the greater part of imports shown, but my assumption is based on assurances from firms dealing with fertilisers that they do in fact supply the greater part of their imports to tea estates, and also to knowledge of the average level of nitrogen, phosphate and potash applications to estate tea.

TABLE VIII

Imports of fertilisers into Ceylon

(Thousands of pounds)

	1939	1946	1948	1949
Ammonium sulphate..	35	30	47	54
Rock phosphates ..	11	18	22	25
Potassic materials ..	7	7	7	13

The sudden increase in the use of potash in 1949 coincides exactly with the Tea Research Institute's discovery in 1948 of a sub-deficiency of potash in our tea soils.

Now fertilisers are expensive, and heavy manuring obviously increases the cost of production. It also accentuates the need for research ; for exact knowledge of the cost of each unit of fertiliser and the value of the increased crop resulting from the use of that fertiliser, is from an economic point of view absolutely essential.

The next point I wish to enlarge upon is how these factors affect our chances in competition with other producers. As I have recently visited the largest producer and our most important competitor, namely, North India and the most rapidly developing producer, namely, East Africa, I will outline the conditions in these countries.

North India

North Indian tea producing areas are over 25° north of the equator. They are part of a large continent and the climate is extreme. The bushes cease to yield in November/December and do not bear again until March/April. The greater part of their crop is, therefore, harvested in about six months of the year. On the other hand the Assam Valley has rich alluvial soil, yields are high and the use of fertilisers is on a comparatively low level. For a few weeks after the winter they produce teas

of a high quality, but as the temperatures rise quality falls to a common level. The land in Assam is like a billiard table and easy to work. Their bushes are mostly of the high yielding Assam type and they are replanting on a routine basis, every 30–40 years. Much research is being done on the selection and actual breeding of high yielding, high quality types. There are also distinct possibilities for mechanisation of production in Assam. They are without doubt our most dangerous competitor but their great weakness is that since 1939 they have resorted to very coarse plucking. They exported much poor tea under the bulk purchase scheme, whereas we in Ceylon maintained a very fair standard and are now reaping the benefit in a better demand for our more constant and better quality. To revert to finer plucking will increase their costs tremendously.

Factories are in North India, on the average, of a very poor standard compared to Ceylon and by tradition they wither and roll all their leaf very lightly. Ceylon manufacture is almost unique by virtue of the very hard wither and very hard rolling we employ for at least our high grown teas and with our fine plucking the result is a combination of high quality and fine appearance which is attractive to buyers. The comparatively small proportion of Assam *season* tea will always attract buyers, but I am confident that we can hold our own with the rest of their production. Our aim should be the continuance of a policy to improve our chief fixed asset (the soil) for the purpose of increasing crops of quality teas — not coarse teas. Any reduction of present crop levels by artificial means such as restriction will lead to uneconomic production costs.

In Darjeeling tea is grown at an altitude of 6,000 feet apart from being almost 30° north of the equator. For six weeks or so after the wintering period teas far superior in quality to anything we can make in Ceylon are produced. For the rest of the year the quality of the crop is about equal to our up-country teas. The land is very steep and yields very low. China and China hybrid types predominate.

Darjeeling teas blend very well with our Uva teas and Darjeeling producers are not really competitive. Owing to their low yields and high costs they are in very serious economic difficulties in spite of the high prices realised for their outstanding quality.

The rest of North India produces mainly common teas.

Africa

In Kenya and Uganda there are large areas of relatively flat very fertile land with an exceptionally well distributed rainfall. However, they are part of a large continent and very close to the equator, so in spite of elevation up to 7000 feet (none of their tea is grown below 3,400 feet, which is the level of Lake Victoria) conditions are not conducive to quality. In spite of the fact that they are planting very mixed types of tea, yield potentials are very high. I saw a block of tea which had actually yielded over 3,000 lbs. per acre. They have made many mistakes, but have now founded a Tea Research Institute of East Africa which Dr. Eden, late of the Tea Research Institute of Ceylon, has organised.

The standard of plucking in Kenya and Uganda is appallingly low. Labour is scarce and only work on estates for a few months, after which they return to the reserves. Consequently no skilled pluckers are available.

Factories are of a very high standard, but are under-equipped and apart from the poor leaf, the standard of technique is low.

Africa cannot be regarded as a serious competitor to our quality teas for some time to come and poor prices for common teas may well damp down developments of tea plantations in that country. However, research and mechanisation may quickly solve many of their problems and we must not be merely complacent about developments in East Africa.

Ceylon

I hope that the strength and weakness of Ceylon producers may now be easier to appreciate. Firstly, our Island climate is equable and rainfall ample. As the greater part of our tea is planted in the hills, much of it between 4,000 and 6,000 feet, conditions are favourable to quality production in spite of our proximity to the equator. Our bushes yield all the year round, but in the area subject to one monsoon only — namely, Uva — the crop distribution is uneven. On the other hand, Uva tea was planted later than the south west side on virgin ground when more was known about management under Ceylon conditions, so yields tend to be higher.

Much of the Dimbula and Dickoya tea was planted on exposed soil following the disastrous coffee disease. After the coffee crash many companies were on the verge of ruin. Tea was a new crop and little known about management or the types best suited to the climate. Seed was in any case difficult to obtain and was apparently, for the most part, material rejected by Assam. High grown Ceylon tea is, therefore, a very mixed bag, but fortunately the hybrid types, though very variable in yield are generally of good quality. More recent plantings at lower elevations contain a higher proportion of the higher yielding Assam types and as the higher temperatures at lower elevations are unfavourable to quality, yield is, in the low-country, the most important consideration.

In spite of these handicaps, the overall yield of Ceylon tea does not compare entirely unfavourably with other producers. The average yield figures obtained by dividing the yield figures given in Table III by the acreage figure given in Table II work out as shewn in Table IX.

TABLE IX

	Lbs. per acre	
	1939	1951
North India ..	500	830
Pakistan ..	——	700
South India ..	470	690
Ceylon ..	430	580
Indonesia : Estates ..	450	385
Small Holdings ..	150	?
East Africa ..	560	620
Estimated Ceylon yield excluding small holdings (200 lbs. per acre)	625	

The large increase in yield in North India since 1939 is partly the result of replanting, but mostly, in my opinion, due to very coarse plucking. Although we must be careful of wishful thinking (and I do not pretend that plucking standards have not deteriorated to some extent in Ceylon) I believe our increased yield is mainly due to generous treatment with balanced fertilisers and to improving management ; in particular to better pruning. The prices realised by Ceylon quality teas in the recent highly discriminating markets fully supports this contention.

The Tea Research Institute may, I think, fairly claim some of the credit for this achievement and I hope that when the full bebefits of protection against blister blight are obtained our yields will increase further.

However, I *do* wish to impress on you that our *very survival* depends on the premium for our quality. Despite all improvements and other advantages, our yields are still low and if buyers will not pay extra for quality, the future is indeed bleak.

Incidentally, Table IX indicates the Indonesian peasants obtained only 1/3rd of the yield obtained by plantations. If we allow 200 pounds per acre as the average yield of Ceylon small holdings which is, I think, very generous, the Ceylon Estate yield is 625 lbs. per acre, but even this is still on the low side. I also mention in passing that the yields for East Africa are misleading as they include figures for so many immature, newly planted, areas.

Another means for counteracting the economic effects of disadvantage in yield is a high standard of manufacture to produce the most pleasing form of leaf. Ceylon factories are on the average, of a very high standard. The Tea Research Institute has aided, where it has not initiated, all attempts to systematise and organise tea manufacturing process in Ceylon. Teas are sold under registered names or marks, and buyers bid much more freely and confidently for teas which maintain a constant standard. If a buyer's confidence is lost it has a prolonged effect upon prices.

The average standard of manufacture in Ceylon is, I am confident, above that of all other producing countries and it is vital that we should maintain that position. Pride in the Ceylon Tea Industry is, therefore, justifiable, but there is no room for complacency. The future will be a struggle for survival and we have at present no more than a slight advantage in this struggle.

To emphasise the importance of our further efforts I will pose a question. What would be done with the highly acid soils which tea demands, the steeply sloping land on which tea *can* be grown, and what other crop will survive the prolonged and sometimes heavy rains to which the tea growing areas are subject ? Coffee and Cinchona are no longer practicable crops. The only answer I can give with any assurance is Forestry. It is a subject which I suggest requires thought.

The importance of, and the scope for, the Tea Research Institute will now be apparent. In outline the problems we must continue to tackle with all possible energy are :—

(1) The maintenance of fertility.

(2) Improving management.

(3) The protection of tea against all diseases, pests and weeds.

(4) Maintenance and improvement of the standard of manufacture with special reference to cost. Constant vigilance with respect to Food and Drug Regulations of importing countries.

(5) Mechanisation.

(6) The selection and propagation of high yielding, high quality types of tea. Soil improvement and management prior to replanting with improved types. To emphasise the importance of this work reference must again be made to the fact that most high elevation estates were planted with hybrid seedlings. A census has revealed that a high percentage of our crop is yielded by a small percentage of the bushes. The elimination of poor yielding types, apart from actual selection of high yielding high quality types, is, therefore, alone worthwhile.

(*Further details of the work of the Tea Research Institute, illustrated by colour slides, concluded the lecture.*)

DROUGHT

T. E. Walter

This paper which is based on an address given by Mr. Walter to the Kegalle Planters Association, discusses ways and means of mitigating the effects of prolonged periods of drought on tea, both in plucking and in new clearings.

The main theme of my address, is " Drought " which I thought would be of topical interest to this district — especially in view of the fact that the drought recently experienced in most low-country districts has been the worst for nearly twenty years. Needless to say, however, I had no sooner started preparing the address than the very severe drought which we had been having in Kalutara gave way to torrential rain, and in agreeing to speak here I had to add " floods permitting." I am afraid the subject matter of the address has thus inevitably lost some of its topical appeal, but I believe the drought is one of your main problems even if, for the time being, it has once more receded into the background.

At first sight one may be tempted to think that drought being an act of God, is just one of those things that one cannot do anything about, except just hope for the best.

The effects of a drought can, however, be very considerably mitigated by careful attention to details of estate management, and it is to these that I wish particularly to direct your attention.

The methods I am going to describe fall naturally into 4 main categories :—

(1) Care of your soil in the initial opening up operations, with the main object of increasing its water holding capacity.

(2) System of planting.

(3) Cultural operations designed or modified to reduce loss of water by evaporation and transpiration to a minimum and, (4) Bush management.

The first main heading — care of your soil — covers a very wide range — not, I hope, of sins, but of good deeds, which should start as soon as any ground is opened up and continued right through the life of the tea bushes ; the later routine works, which naturally affect the cultivation and care of the soil to a greater or lesser extent, I have included under cultural operations. Thus the first food deed that is invariably waiting to be done on opening up land is the blocking at intervals of all old main leader drains with boulders and stumps, and unsaleable lengths of wood which would otherwise be left scattered about the ground. By this means a series of check drains is formed, whose primary object is to hold up the maximum amount of water on the land — an ideal which is all the more desirable in districts such as this which are deficient in rainfall. I use the term " leader drain " purely for want of a better one. What I have in mind is the natural vertical channels which excess storm water invariably carves out for itself on hillsides, leading eventually to the formation of gullies. This technique is far simpler and cheaper than making stone lined main leader drains, which do not of course make any contribution towards water storage.

Secondly, and with the same object in view, special attention needs to be paid to the layout of the drainage system ; the ideal gradient to aim at is about 1 : 120 with not more than 25 feet between each drain (less on very steep land). These

should be constructed on the reverse slope (lock and spill) principle, which makes the ponded water available over a far wider range than silt pits. Unfortunately, most of the drainage systems laid out in tea plantations in the bad old days have a far steeper gradient, and while it is scarcely feasible to alter these, there could easily be blocks at intervals, so as to pond more of the water on the spot.

The prevention of surface run-off, particularly from showers during a dry period when the ground is baked, is a further important water conservation measure; this can best be achieved by the growing of green manures and cover crops which will be discussed later.

A further point of importance in connection with opening up of new clearings is that trenching gives the young plants the best chance of getting away and developing a good spreading root system ; it is consequently recommended wherever feasible in preference to holding as a drought precaution.

Considering secondly the system of planting that gives the best results, there is no question about it that seed at stake is by far the safest method. It its essential, however, to put the seed out from the germinating beds as soon as it cracks and with this proviso, it is quite safe to do the operation during spells of dry weather, if there is a reasonable anticipation of rain.

Should a combination of adverse circumstances make it impossible to put out all your seed as soon as it cracks, a situation which occurs in practice more often than not, the over-germinated seed should be put into baskets for use in the field as soon as can be managed. These basket plants cost only 1 cent each, which I think you will agree is a trifling insurance for the results than can be achieved, since over-germinated seed cannot be put direct into the field with any degree of safety. For this information I am much indebted to Mr. Perkins of Rye Estate, Balangoda.

Another and comparatively unknown method which, within certain limitations appears to give comparable results is the use of seedlings which have been in the nursery some 4–5 months ; the main advantage of this technique is that it enables the young plants to derive the full benefit of a " hardening off " process in the nursery.

It is surprising to see that stump planting is still widely used, even in the drier areas of the low country, since my observations have been that this system does not bear comparison with the methods already outlined. Of course, quite good results can be obtained by using the Hersall Transplanter so that there is virtually no root disturbance, but this technique is inevitably slow and expensive, and therefore, scarcely applicable to really large scale work. An estate in the Pelmadulla area has provided an interesting and forcible comparison between seed-at-stake and stumps, for the part of the new clearing that had been planted with stumps was an almost complete failure as a result of the following drought, while fully 80% of the seed at stake on an adjacent block came through. On the other hand, stumps of course have the advantage that they do not get washed out of the ground by heavy rain as seed at stake tends to on very steep areas.

While on this subject I will refer, in passing, to vegetative propagation vis-a-vis drought. In the drier areas it becomes doubly necessary to select drought resistant clones from numerous small-scale trials, and to use only well grown plants. The element of luck can be reduced further if the plants are put out right at the start of the monsoon, for the period of initial establishment is, of course, the most difficult.

So much for the initial opening up works, and I now come to the numerous cultural operations which are an indispensible adjunct to good tea cultivation ; here I will discuss briefly the use of cover crops, bush green manures and shade trees, artificial manuring and forking, weeding and thatching in relation to drought.

The principal object of cover crops is, as their name implies, to cover the soil thus protecting it from the harmful effects of the sun and the consequent loss of organic matter in the top soil. Normally there is a gap of some 3–5 years before the covering of tea in a new clearing is complete and a year or two before the shade tree canopy makes any very effective contribution. It is during this initial period that much harm can be done by exposure of the soil to the elements — damage that can easily be prevented by the establishment of leguminous cover crops. As a mere repetition of the names of some of the most promising ones would not convey anything to most of you, I have brought along some samples to give you a better idea of their habit. Some of these are indigenous — an obvious advantage since even if the birds neglect to drop the seeds where you want them, they can easily be established, and in this category I would particularly mention *Desmodium triflorum* (a dwarf leaved species common in lawns), *Desmodium heterophyllum* and *gotu-kola.* These have a low spreading habit and are sufficiently dense to help considerably towards suppressing weeds, and several estates have reported marked effects on their yields as a result of a policy favouring *gotu-kola.* Should these covers get so well established, however, that they form a dense mat on the surface of the soil, it may be necessary to fork them up periodically, in which case strip cropping on the contour is recommended.

Of the better known and more widely used cover crops *Indigofera endecahylla* is perhaps the most suitable for general purposes, as it is least liable to smother the tea. It is easy to establish from seed and cuttings, and is particularly suitable for contour hedges on steep land. *Desmodium ovalifolium* is very suitable for growing on the tops of drains and steep banks, but it is such a strong and vigorous grower that it tends to smother the young tea plants and it has to be cut back regularly.

Of the lesser known species *Stylosanthes gracilis* is outstanding on account of its low, bushy habit and volume of " green stuff " produced ; this has only recently been introduced and the supply of seed is consequently not yet equal to the demand. It is, however, extraordinarily easy to grow from cuttings, and the superintendent of an estate in this district tells me that he hopes to be able to establish it in this way over an area of 10 acres by next year, from his original plot raised from 1 ounce of seed which he received only a few months ago.

Alysicarpus is also worthy of special mention, in the low creeping category.

With regard to bush green manures, I do not intend to give a similarly detailed account of the various species. An important point I wish to make is that whenever possible these should be established six months or a year before the tea plants are put out to provide very necessary shade to the young plants, and to act as low wind breaks ; this latter aspect tends to be overlooked, but the effects of a drought are naturally far more serious if it is combined with a hot dry wind. Moreover, wind is the principal contributory factor in the development of collar rot in young seedlings, which is one of the commonest afflictions in insufficiently protected new clearings ; also the effects of wind erosion on dry sandy soils are by no means trifling.

I mentioned the question of reducing surface run off earlier, and with this in mind the ideal way of covering the soil and providing protection for the young plants seems to be to grow tall bush green manures and low cover crops in alternate lines.

It appears that some people are averse to growing bush green manures in new clearings on account of the fact that they compete with the tea for water. It is an obvious truism that water is just as necessary for the growth of the bush green manures and cover crops as it is for the tea, and some root competition for water is inevitable when there are two or more crops growing on the same area. It is, however, a very sensible matter to ensure that the maximum amount of water is made

available to the tea merely by lopping the bush manures as soon as a severe drought seems likely. This applies also to the more vigorous deep rooted cover crops which, however, tend to die down or at least to wilt and remain in a state of suspended ammunition during drought, so that the water lost by transpiration is at a minimum. In the case of cover crops such as *D. triflorum* and *gotu-kola* whose rate of transpiration cannot be so controlled, the fact that they are very shallow rooted minimises competition with the tea, and moreover the topmost layers of soil dry out in any case during a drought.

The rate of transpiration, on which the moisture consumption depends, is proportional to the leaf surface area and hence in the case of shade trees it is all the more important to keep it under control during periods of drought. It is, therefore, most essential that low-country estates in the dry areas should as a matter of routine plan their lopping to coincide with the start of the worst of the dry weather periods. If this is done, one at least of the objections to various fast growing species such as dadaps and *A. moluccana* founders and as these species have remarkable powers of recovery, there is no reason why the young trees in new clearings should not be so treated. Of course, this dry weather lopping is found to increase the incidence of sun scorch and brown blight, but you will no doubt agree that these can well be tolerated if the alternative is to lose large numbers of bushes from drought. I would, therefore, emphasise that the measure is only applicable to *low-country, drought areas* ; further, in these districts, the loppings should be left on the surface of the ground to form a mulch.

Of course, a drought such as we have just had, though fortunately from the planters' point of view, of rare occurrence provides unique opportunities for making observations. Thus an interesting observation I made recently in the Balangoda area in connection with shade trees was that in a field of mature tea which had suffered as much as 50% casualties, it was quite impossible to distinguish any sort of pattern of distribution of the casualties. The stand of shade trees on this particular field was rather irregular, and consisted of lopped gliricidias and albizzias, with a few scattered old unlopped albizzias, and there were some quite large bare patches. It is, therefore, reasonable to draw the conclusion that the shade tree roots had not exerted any significant effect vis-a-vis the drought ; the most satisfactory explanation is that drought resistance of tea bushes is largely a matter of the root development of each individual bush, which is a genetic character.

Another observation was that low-lying deniya areas with a high water table suffered most from the drought — the probable explanation being that the longest and deepest roots of the tea bushes had died off as a result of water-logging, leaving only those near the surface to support them ; this merely serves to emphasise the importance of careful drainage on deniya areas.

The next routine cultural operations to be considered in relation to drought are manuring and forking and weeding ; here the point at issue is " soil disturbance " the effect of which is, naturally, to increase the rate of evaporation of water from the soil. It follows, therefore, that no forking in of manure — and especially deep forking — should be done at a time when a drought is anticipated ; admittedly the alternative in practice seems to be to manure during periods of torrential rain, but on balance this seems to be the lesser of the two evils, provided the principle of manuring a little and often is as far as possible observed to minimise losses of nutrients. Similarly with regard to weeding, the enthusiasm shown by most superintendents for keeping their estates clean weeded is entirely misplaced when it involves scraping the soil during dry periods.

Lastly in this connection — mulching. The importance of having a good mulch on the ground in the dry zones cannot be over-emphasised for not only is the loss of water by evaporation greatly reduced, but the water holding capacity of the top soil is greatly increased by the humic matter. In this respect any available

material helps the good cause — the natural mulch formed by grevillea leaves being worthy of special mention — but the loppings of Guatemala grass and Napier grass undoubtedly take pride of place. These of course present the problem of finding adequate space for producing enough material to thatch large areas ; one very neat solution to this problem — at least in the dry zones — is to grow it in and along the drains, and an estate I visited recently in the Balangoda area had by this means grown enough from *in situ* planting to thatch all the new clearings.

I now come to my last main heading — bush management, and will very briefly consider centering, pruning and skiffing in relation to drought. The main point I wish to make here with regard to the first is that if a drought follows the centering of new clearings, considerable losses are bound to result ; for this and several other reasons we, therefore, recommend either thumbnail pruning which involves only the removal of young shoots — or bending over with or without layering, neither of which method involves the use of the knife.

With regard to pruning, although some estates in the Balangoda district prune regularly with the dry weather in order to make the most of the forcing months, I do not think conditions here warrant it as a routine operation. Recovery is of course much slower, liability to sun scorch is increased and should an exceptionally bad drought set in, there is naturally considerable risk. On the other hand, a very slight skiff — often referred to erroneously as " stripping " the bushes — is most necessary when the drought is sufficiently severe to cause permanent wilting. The same principle (*i.e.*, reducing transpiration by reducing the number of leaves) can also be applied as an emergency measure to new clearings.

THE ESTABLISHMENT OF GREEN MANURES IN MATURE TEA AREAS

F. Haworth

The establishment of stands of shade trees in a rotation designed to facilitate management is a problem affecting most Ceylon tea estates. In the following article Dr. Haworth describes a method which has given a high degree of success in establishing young shade trees as replacements in mature tea areas.

Many estates, particularly in the wetter parts of the Island, experience considerable difficulty in establishing green manures and shade trees in mature tea areas. In general, few difficulties are encountered in obtaining a good stand of green manure and shade trees in new clearings, but the supplying of mature areas is in many cases extremely difficult.

Since the optimum type of shade on mature tea areas would appear to be obtained from an uneven aged stand containing several species and since this system entails annual replacement of a proportion of trees on every acre of the estate, it is imperative that some method of supplying shall be devised which will be reasonably successful in most areas and will therefore, facilitate the adoption of an optimum shade policy with regard to mature tea.

Examination of the methods in use on many estates led the writer to the conclusion that the main reason for the lack of success in supplying green manure and shade trees in mature (pruned) tea was that the plants put out were in most cases far too small to have a reasonable chance of establishment in competition with already established and closely growing tea. This position has been aggravated by the lighter style of pruning which has recently been adopted in most up-country areas and it was to overcome these difficulties that the experiments described in the following were laid down.

It was decided that the aim should be to supply a vigorously growing plant not less than 18″ in height. This size would ensure that the young plant would not be smothered by the adjoining tea bushes. It is obvious that a plant of this size must have a root system very much larger than a 3–4 inch plant normally put out from estate nurseries and in consequence it was decided that the plants should be grown in large baskets (8″ diameter × 10″ deep) and that various manurial treatments should be applied to the soil in the baskets. The treatments are set out in Table I.

TABLE I

All the soil used was limed to a pH value of between 6.0 and 7.0

Treatments

(1) Soil only
(2) Soil + fertilizer mixture 1
(3) Soil + fertilizer mixture 2
(4) 1 part soil + 1 part compost
(5) 1 part soil + 1 part compost + mixture 1
(6) 1 part soil + 1 part compost + mixture 2
(7) Soil in small basket as in estate practice

Fertilizer mixture 1

Calcium cyanamide	1 part
Basic slag	2 parts
Muriate of potash	1 part

Fertilizer mixture 2

Sulphate of ammonia	3 parts
Superphosphate 20%	2 „
Muriate of potash	1 part

The fertilizer was added at the rate of 8 ozs. per 340 lbs. of soil or soil plus compost.

The two test plants chosen were *Albizzia moluccana* and *Grevillea robusta*. Each manurial treatment consisted of 100 baskets and 3 seeds of the species mentioned were sown in each basket. The seeds were put in on February 12th 1952, but germination was most uneven due to poor samples of seed, and total germination was not more than 30%. On the 14th of April, 1952, 20 baskets from each treatment were selected for uniformity of the plants which they contained and transferred to another nursery bed (with the baskets intact). Here they were subjected to normal estate routine maintenance, being dusted with insecticides when necessary and sprayed with copper fungicides as required to give protection against Ceratophorum disease.

The plants were measured on 29th September, 1952, and the measurements are set out in Table II. It will be seen that the plants in large baskets, amply supplied with manure and compost, have attained a size some two to three times that of plants planted at the same time in small baskets and given inadequate manurial treatment. Plates Nos. 1–7, give a very clear indication of the benefits to be derived from adequate manuring and careful attention in the nursery.

TABLE II

Showing mean heights of plants from the different manurial treatments

GREVILLEA ROBUSTA

Treat No.	1	2	3	4	5	6	7
Mean height (inches)	5.7	7.2	7.4	10.3	9.3	6.9	4.1

ALBIZZIA MOLUCCANA (FALCATA)

Treat No.	1	2	3	4	5	6	7
Mean height (inches)	5.4	15.6	11.2	11.4	12.6	13.7	6.4

The plants were planted into the field in a pruned area on 29th September, 1952 and almost immediately ran into extremely bad weather in the form of strong winds and high rainfall. The plants were put into holes and one ounce of fertilizer supplied to each plant — one half in the bottom of the hole, and one half on the surface around the plant. At the time of writing (27th October, 1952) out of 230 plants transplanted into the field, there have so far been no casualties whatsoever. The plants appear to be established and many of them are growing and putting out new leaves. It appears reasonable to suppose that, using plants of the size and vigour described, establishment in the field should never be less than 90%.

The costing of such an enterprise may well surprise many experienced planters. On the basis of the cost per tree *when established in the field*, the system outlined in this article is, in fact, much cheaper than normal estate green manure supplying. Taking St. Coombs Estate as a basis, and assuming that under normal estate practice, one-third of the plants put out eventually come to maturity, the cost per plant established in the field, comes to the very considerable sum of Rs. 1/62. Under the

Plates Nos 1 — 7

system outlined in the foregoing, using large baskets and adequate supplies of fertilizer and compost in the baskets, the cost should not be more than 80 cts. per plant established in the field (*See* Table III). This calculation assumes that a specially built greenhouse is used instead of the usual ground nursery.

TABLE III

Cost of greenhouse for an annual outturn of 4000 plants Rs. 9000.00

Depreciation (25 years)	Rs.	360.00
4250 baskets at 17½ cts.	,,	750.00
8 loads horse manure at Rs. 50/-	,,	400.00
4 cwts. inorganic manures	,,	100.00
1 nursery man	,,	800.00
	Rs.	2410.00
Planting cost 400 at 15 cts.	,,	600.00
	Rs.	3010.00

Assuming 90% survival, cost per plant established in the field would be 84 cts. approximately.

The cash saving in this way would be very considerable, but of possibly more importance would be the fact that a field once supplied would need little re-supplying and most estates will agree that it is the cost of re-supplying vacancies which is so high under normal estate condition. If a system of rotation of shade is adopted, then it is imperative that a really efficient means of establishing green manure and shade trees be evolved and it is hoped that this article may make some contribution to that end.

CHEMICAL AND BIOLOGICAL CONTROL OF INSECTS IN PERENNIAL CROPS

A REVIEW

B. N. Webster

Many inquiries have been received recently, both from suppliers and potential users, on the subject of the latest developments in insecticidal chemicals. The following review is intended as a warning as it makes mention of what has happened to the insect populations of a perennial crop, namely apples, following insect control by chemical means. Mention is also made of systemic insecticides and the possible dangers arising from their use on food crops.

Material has been drawn from the proceedings of the International Horticultural Congress held in London, and the Third International Congress of Crop Protection held in Paris, both in September of this year.

" Dr. A. M. Massee of East Malling, speaking in London on the subject of fluctuations in the insect population of orchards, dealt with the effects of spraying programmes on both injurious and beneficial insects during the past fifty years. At the beginning of the century some sixty species of insects were recognised as potentially injurious to the apple crop, and caustic soda spraying, lime washing, and grease banding were instituted in an effort to effect some control.

By 1922 it had been realised that none of the major pests was affected to any large extent by these measures, and tar-oil winter washes were introduced. Almost immediately a marked change in the orchard fauna was noted. Four or five major pests were, to a large degree eradicated by this method, and the growers interest in crop protection was stimulated. Adverse effects were also noted, and in 1925 Massee found that there was a notable increase of the Fruit Tree Red Spider Mite, the over-wintering eggs of which were unaffected by the sprays. In addition several bugs and Ladybird beetles, predators on the mite, were either killed whilst hibernating in bark crevices etc., or moved to more favourable winter quarters.

From this time to 1933 the spray programme in orchards consisted of tar oil winter washes, a combination spray of lime sulphur, nicotine and lead arsenate, applied twice in spring, and a summer spray of lead arsenate to control Codling Moth and Tortrix. This spray programme produced a very marked effect on populations and it was noticeable that although the number of species of important pests was less, a higher percentage of the crop was attacked by those remaining. In particular the Capsid Bug was very prevalent, leading to the introduction of DNOC (dinitro-orthocresol) winter sprays, to control winter eggs of Capsid, Red Spider Mite, aphids and apple sucker. A partial control was obtained, but the Capsid however still proved troublesome. A more important effect of DNOC was the almost complete elimination of the few beneficial insects remaining, with the result that out of the sixty or so potential pests at the beginning of the century, only six or seven were now troublesome, but these were present in greater numbers, and their adequate control required as many as ten different insecticidal applications.

With the advent of DDT and BHC* spraying during the years 1946–48, it was realised that most serious pests could be temporarily eradicated from orchards. Later it was found that far from being a panacea for all ills of the apple crop, the use of these synthetic insecticides had led to a further increase in the Red Spider Mite, both by the killing of predators and in the case of DDT by a stimulation of reproductive activity. Neither has any adverse effect on any stage of the mite's life

* The active principle of " Gammexane ", " Agrocide " etc.

history. The new insecticide parathion, does, however, kill the mite in all stages but the egg, but again an adverse effect is noted as parathion kills most predatory species, including those on the Woolly Aphid. Consequently the Woolly Aphid appears to be still persistent.

Dr. Massee concluded by urging the need for detailed studies of the whole insect population of orchards, rather than concentration purely on the life histories of given pests, such as has been the practice of entomologists in the past. Such an approach, he felt, would lead to necessary modification of the spray programmes, particularly the timing of applications.

Dr. W. A. Ross of the Canadian Department of Agriculture speaking on the harmonizing of chemical with biological control, also drew attention to the possibilities of modifying the present spraying schedules so that they will supplement, and not work at cross purposes with the natural enemies of insect and mites.

He accounted for the present intensification of pest control programmes by giving several reasons, principal amongst which is the influence of treatments on natural enemies, and gave examples of how, in Ontario, modification of the programmes has already shown some advance. Control of the Oyster-shell scale was effected by changing a fungicidal spray, namely sulphur compounds, for copper and ferric compounds. Sulphur was found to control two natural enemies of the scale, a mite and a fungus, thus leading to build up of attacks of scale. Following the substitution of copper and ferbam for sulphur this scale has now become of very minor importance.

Referring to the Codling Moth, Dr. Ross stated that it appeared that certain general insect predators were most important in the natural control of this pest, and that in order to retain these general predators a sufficiently high insect population of species other than the Codling Moth must also be maintained in order to provide an adequate food supply. Thus the spray programmes must be modified in such a way that insecticides applied do not have too drastic an action on desirable species. Dr. Ross concluded by stating that such studies as had been undertaken were still only exploratory, but that he believed that a continuation of them would lead to what is nothing more or less than the intelligent use of spray chemicals.

In Paris, both M. Lefevre, the President of the Congress and Dr. Muller, discoverer of the insecticidal properties of DDT, emphasised the necessity for the retention of natural control and the supplementing of it by chemical methods. Dr. Muller re-emphasised the fact that man has, by crop protection methods, replaced a natural balance of nature by a new equilibrium, and that the unnatural equilibrium had constantly to be rebalanced in man's favour.

Dr. Ripper, Managing Director of Pest Control Ltd., speaking on systemic insecticides mentioned the three main groups of systemics. Firstly, those in which the active principle remains unchanged, secondly those which are ultimately broken down by the plant into harmless substances, and thirdly those which are absorbed but transformed into other toxic substances before being broken down. The most promising group is the second, but he stressed the importance of the " forbidden period " *i.e.*, that period elapsing after application before the insecticide becomes harmless. This is most important in the case of food crops, on which only those insecticides shown by analysis to leave no toxic residues should be used."

So far none of the new insecticides are advocated for general use in the tea crop. The reason should be clear. At the moment with the exception of shot-hole borer, there are no major insect pests of tea, and an adequate natural balance appears to be maintained. Occasional local outbreaks of such pests as Helopeltis do occur, and the use of DDT on very small areas to contain the attack is advised. There are already reports both from India and Ceylon that DDT sprayed or dusted areas have shown evidence of increased activity on the part of the Red Spider Mite of Tea. Consequently, we would urge again that until more is known of the effects of DDT and BHC on the insect population of tea fields, that these insecticides should only be used following a specific recommendation from the Tea Research Institute.

MINUTES OF THE MEETING OF THE BOARD OF THE TEA RESEARCH INSTITUTE OF CEYLON HELD AT 2-30 P.M. ON FRIDAY, 18TH JULY, 1952, AT THE OFFICES OF THE PLANTERS' ASSOCIATION OF CEYLON, THE LAWN, 113, STEUART PLACE, COLPETTY, COLOMBO

Present—Mr. H. S. Hurst (Acting Chairman), Mr. W. R. Vander Kiste (Chairman, Planters' Association of Ceylon), Mr. W. H. Gourlay (Chairman, Agency Section, Planters' Association of Ceylon), Messrs. G. K. Newton, A. J. Dickson, G. J. Harris, L. F. J. Smith, W. Neal de Alwis, J.P., U.M., M.P., Errol Jayawickreme, D. E. Hettiarachchi, J.P., U.M., V. G. W. Ratnayake, M.P., M.B.E., and J. Lamb (Director & Secretary to the Board).

1. Notice convening the meeting was read.

A letter from Dr. A. W. R. Joachim, M.B.E., (Director of Agriculture) and a message from Mr. A. G. Ranasinha, C.M.G., C.B.E., C.C.S., (Secretary to the Treasury) regretting inability to be present were tabled.

2. **Membership of the Board & Committees**

(a) **Board**

The Chairman reported the following changes in the personnel of the Board which had taken place since the last meeting.

(*i*) Mr. R. C. Scott, C.B.E., had proceeded on furlough on 5th May, 1952. In response to Circular No. A7/52 of 4th April, 1952, Mr. Hurst was unanimously elected to act as Chairman during Mr. Scott's absence. Members had been informed of the decision by Circular A8/52 of 23rd April, 1952. Mr. Scott was expected back in Ceylon in November.

(*ii*) Mr. W. H. Attfield had resigned his seat on the Board with effect from 4th March, 1952, prior to proceeding on furlough. Mr. G. Harris of Messrs. Whittall & Co., had been nominated by the P.A. Agency Section to take his place.

(*iii*) Mr. A. D. McLeod had proceeded on furlough and Mr. L. F. J. Smith of Messrs. Colombo Commercial Co., had been nominated by the P.A. Agency Section to act for him with effect from 24th April, 1952.

(*iv*) Mr. W. R. Vander Kiste on his election as Chairman of the Planters' Association of Ceylon replaced Mr. R. C. L. Notley as an ex-officio member as from 28th March, 1952.

(*v*) Mr. H. de T. Wilkinson-Kay's term of office had expired on 30th June, 1952. Mr. A. J. Dickson of Passara Group, Passara, had been nominated by the Planters' Association of Ceylon to fill the vacancy as from 1st July, 1952.

The Chairman thanked all outgoing members for the services rendered to the Institute as members of the Board. He made special mention of Messrs. W. H. Attfield and R. C. L. Notley.

He extended a cordial welcome to the new members, all of whom were present at the meeting.

The Secretary was asked to convey to the outgoing members the thanks of the Board.

(b) **Finance Sub-Committee**

The Chairman reported that two vacancies required filling *i.e.*, those created by the departure of Messrs. R. C. Scott and W. H. Attfield. He proposed that Mr. Errol Jayawickreme be elected to act for Mr. Scott and Mr. W. H. Gourlay take the place vacated by Mr. Attfield. Agreed.

(c) **Estate & Experimental Sub-Committee**

The Chairman pointed out that as Mr. Newton was the Visiting Agent for St. Coombs Estate a seat was vacant on this Committee. He referred to Mr. Newton's most comprehensive and interesting report on his first visit to the estate on 5th and 6th April, 1952.

He further stated that the Uva and Low-Country districts were not represented on the Committee and proposed that Messrs R. J. S. Bean, A. J. Dickson and D. E. Hettiarachchi be nominated to fill those places. Agreed.

Finance

(a) **Accounts for period ending 30th April, 1952**

The Chairman informed the meeting that the Audited Accounts for 1951 and the Auditor's Report thereon had not been received. They would therefore come up for consideration at the next meeting of the Board.

Copies of the accounts of the Institute for period ending 30th April, 1952 had been issued to members. Those accounts might be subject to slight alterations on receipt of the audited accounts.

He said that members would note with pleasure that the St. Coombs Estate Working Account had shown a Profit of Rs. 3,871/21 at as early a stage in the year as April. That had been brought about chiefly as a result of the exceedingly favourable cropping weather experienced at St. Coombs during the period January to April and also to the fair market prices realised on our teas.

Crop to end of June, 1952 had totalled 153,402 lb., an average of 25,580 lb. per month. The yield per acre at end of June was 156 lb. ahead of last year. If favourable conditions persisted, it was most likely that the estate would end up the year in as favourable a position as in 1951.

Cess collections to end of April had also been most favourable and had totalled Rs. 263,418/40 as against Rs. 230,818/84 to same date last year. It would interest members to know that the total cess to end June 1952 was Rs. 425,345/67 as against Rs. 387,191/67 in 1951 and a total estimate for 1952 of Rs. 735,000/-.

(b) **Investments**

(*i*) **T. R. I.** The Chairman reported that an application had been made for re-investment in the 3% Ceylon Government Loan of the sum of Rs. 15,000/- obtained from the 3% Defence Loan which had matured on 23rd February, 1952.

(*ii*) **Junior Staff Provident Fund** The Chairman reported that the following investments had been made on behalf of the above Fund as decided at the previous meeting of the Board.

Rs. 17,000 in 5 years savings certificates (maximum holding)
Rs. 8,000 in 12 „ „ „ „ „

An application had also been made for the investment of the further sum of Rs. 25,000 in the 3% Ceylon Government Loan in accordance with the previous decision of the Board.

There would be a total of Rs. 184,649/65 invested on behalf of the Fund when the above investment was made.

(*iii*) **Junior Staff Medical Fund**

The Chairman reported that the sum of Rs. 6,000 had also been invested in 5 years saving certificates on behalf of the above Fund as decided at the last meeting of the Board.

Staff

(a) **Director**

The Chairman reported that Mr. J. Lamb, Director, returned from the United Kingdom on the completion of his home leave on 21st May, 1952. He had on his way home paid a visit to the Tea Research Institute of Kenya, visited a number of tea plantations in Kenya and Uganda and attended the formal opening of that Institute on the 27th March, 1952. A lecture on his visit to East Africa was now being delivered to the various District Planters' Associations.

(b) **Plant Physiologist**

The Chairman reported that Mr. G. B. Portsmouth had proceeded on eight months' home leave on 20th May, 1952.

(c) **Pathologist**

(*i*) The Chairman reported that Mr. C. A. Loos sailed for the United Kingdom on the 25th April to begin his course of 6 months' training at Rothamsted Experimental Station. He had already settled down to his task very well judging from reports received.

(*ii*) The Chairman informed members that the F.A.O. had decided to postpone Mr. Loos's scholarship in the United States. The matter would be taken up again early in 1953.

(*iii*) **Visit to Sandoz, Switzerland**

The Chairman stated that Mr. Loos had received an invitation from the Directors of Sandoz, Ltd., Switzerland, to visit them as their guest for a period of 3 days.

(d) **Agricultural Chemist**

The Chairman reported that Dr. F. Haworth who had assumed duties as Agricultural Chemist on 4th August, 1950, had sent in his resignation and had asked to be released by the end of the year.

He considered it essential to have the post advertised as quickly as possible. The Director had, therefore, with the unanimous approval of the Appointments Sub-Committee arranged for the post to be advertised in " Nature " and also sent copy of the advertisement to the Registrar of the Royal Institute of Chemistry for publication in their appointments register. The advertisement had also been forwarded to the " Times " (London) as suggested by the Registrar of the Royal Institute of Chemistry.

(e) **Proposed visit by Dr. Dowson**

The Chairman reported that Dr. Dowson, Reader in Plant Pathology at Cambridge University, who had agreed to visit the Institute for two to three months to advise on the programme of research in Pathology had postponed his visit until after Mr. Loos's return from the United Kingdom.

(f) **Assistant Secretary/Librarian**

The Chairman reported that Mr. G. Mason had completed six months service and the Director had recommended the confirmation of his appointment as Assistant Secretary/Librarian.

Small Holdings Advisory Service

(a) **Inspection of Small Holidings**

The Chairman reported that the Director had carried out inspections of small holdings in the Southern Province and Morawak Korale in the company of Mr. Illankoon, the Officer-in-Charge.

The Director said he was pleased to record that, from what he had seen, it was evident that Mr. Illankoon had organised his work well and that he found most of the officers very keen on their work. He referred to the difficulty the officer stationed at Morawak was experiencing in finding a suitable house.

Mr. V. G. W. Ratnayake agreed to do what he could to help in this matter.

Mr. G. K. Newton referred to the poor standard of teas from bought leaf factories which were being shipped to London. He was strongly of the opinion that unless small holders were induced to improve the quality of the leaf they produced, most bought leaf factories would soon have to go out of production.

The Director suggested that a meeting be arranged to which Messrs. V. G. W. Ratnayake, W. Neal de Alwis and U. B. Unamboowe and the Senior Small Holdings Officer be invited in order to discuss what action should be taken in this matter. The meeting could also discuss the subject of co-operative factories.

(b) **Lease of Bungalow at Peradeniya. Signing of Indenture of Lease**

The Chairman stated that the Indenture of lease embodying the terms and conditions agreed upon at the inauguaral meeting of the Small Holdings Sub-Committee held on 15th October, 1951, and accepted by the Board on 21st December, 1951, had been drawn up. Messrs. Julius & Creasy had scrutinised the document and it had been arranged for Messrs. G. K. Newton and G. J. Harris together with the Director to sign it on behalf of the Board.

As the Institute's seal would be set to the document, the Chairman said that a formal proposal was necessary and he proposed that :—

> " Resolved that the execution of the lease in favour of the Institute for a period of three years commencing from the 1st of October, 1951 relating to the bungalow and premises called " Keppelstone " in extent A. 0 R. 1 P. 18 under the seal of the Board in the presence of Mr. G. K. Newton and Mr. G. J. Harris members of the Board and Mr. James Lamb the Director of the Institute on the 18th day of July, 1952 is hereby confirmed." Approved unanimously.

Any Other Business

Electric Supply

The Chairman informed members that negotiations had been re-opened with the Government Electrical Department for the linking up of St. Coombs to the Government electric supply. To begin with it was proposed to connect up the factory and the Junior Staff line and later, if funds permitted, to connect up the laboratory and Senior Staff lines.

(Sgd.) J. LAMB,
Secretary

Tea Research Institute,
Talawakelle.

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NOTICES

The Institute's Laboratories and Offices are situated at St. Coombs, Talawakelle, and all applications and enquiries should be addressed to the Director, Tea Research Institute, St. Coombs, Talawakelle.

Specimens and other consignments sent by rail should be forwarded to Talawakelle Station c/o Messrs. M. Y. Hemachandra & Co., Forwarding Agents. *Carriage should be pre-paid.*

Visitors' Days. The *second* and *last* Wednesdays in each month have been set aside as Visitors' Days at St. Coombs Estate, and also at the T. R. I. Sub-Station, Gonakelle Estate, Passara, when it is hoped anyone interested will visit the Stations.

Rules for the Occupation of St. Coombs Guest House

(1) The Guest House is normally intended for the use of persons visiting the Institute and St. Coombs Estate on business. Children can in no circumstances be accommodated.

(2) Permission to occupy a room for the night must be obtained from the Director in writing and, unless sufficient notice be given, accommodation cannot be guaranteed.

(3) All visitors must sign the Visitors' Book on arrival.

(4) A bedroom may not be occupied for more than one night if required by another visitor. This shall not apply to Members of the Board or of Committees meeting at St. Coombs who shall also be entitled to priority in the allocation of accommodation when on official business.

(5) Complaints or suggestions shall be entered in the book provided for the purpose and not made to the Guest House Staff. All payments due for services rendered shall be made in *cash* to the Guest House Keeper and a receipt obtained from him on the official form. The scale of approved charges is posted in the building. The Guest House Keeper is forbidden to give credit or to accept cheques.

(6) All breakages will be charged for at cost price.